WHAT IS CLAIMED IS:

1.   A position control device for causing a position of a control system, including a servomotor and a moving body driven by the servomotor, to track a command value, the position control device comprising:

a sliding mode controller for receiving command position r and state variable x of the control system and for providing a control input u to the servomotor, wherein state variable x is expressed as follows:

$$x = \begin{bmatrix} \theta \\ \dot{\theta} \end{bmatrix},$$

wherein θ is feedback position and $\dot{\theta}$ is feedback velocity; and

a disturbance variable compensator for compensating control input u based on feedback velocity $\dot{\theta}$,

wherein with a hyperplane matrix S as $[S_2 \quad S_3]$, a switching function σ in the sliding mode controller contains $S \cdot x$.

2.   The position control device according to claim 1, wherein the control input u to the servomotor is a q axis current Iq.

3.   The position control device according to claim 1, wherein an equation of state for the control system is expressed as follows:

$$\begin{cases} \dot{x} = A \cdot x + B \cdot u \\ y = C \cdot x \end{cases}$$

$$A = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 \\ Kt/J \end{bmatrix}, C = \begin{bmatrix} 1 & 0 \end{bmatrix}, x = \begin{bmatrix} \theta \\ \dot{\theta} \end{bmatrix}, u = Iq ,$$

wherein J represents a moment of inertia and Kt represents a torque constant of the servomotor.

4.   The position control device according to claim 3, wherein an equation of motion for the control system is expressed as follows:

$$J\ddot{\theta} = Kt \cdot Iq - d$$

5.   The position control device according to claim 3,

wherein said sliding mode controller is input with command velocity $\dot{r}$ and command acceleration $\ddot{r}$, and with C_{ff} and A_{ff} as gain, wherein the switching function σ is expressed as follows:

$$\sigma = S \cdot x + C_{ff} \cdot r + A_{ff} \cdot \dot{r} ,$$

wherein the control input u is the sum of linear control input u_l and non-linear control input u_{nl}, and

wherein the linear control input u_l is expressed as follows:

$$u_l = -(S \cdot B)^{-1}(S \cdot A \cdot x + C_{ff} \cdot \dot{r} + A_{ff} \cdot \ddot{r}) .$$

6.   The position control device according to claim 5, wherein non-linear control input u_{nl} is expressed as follows:

$$\overline{u}_{nl} = -k(\overline{S} \cdot B)^{-1} \frac{\overline{\sigma}}{|\overline{\sigma}| + \eta} .$$

7.   A position control device for causing a position of a control system, including a servomotor and a moving body driven by the servomotor, to track a command value, the position control device comprising:

a sliding mode controller for receiving command position r and state variable x of the control system and providing a control input u to the servomotor without using integrating elements, wherein state variable x is expressed as follows:

$$x = \begin{bmatrix} \theta \\ \dot{\theta} \end{bmatrix}$$

wherein θ is feedback position and $\dot{\theta}$ is feedback velocity; and

a disturbance variable compensator for compensating control input u based on feedback velocity $\dot{\theta}$.

8.   The position control device according to claim 7, wherein the control input u to the servomotor is a q axis current Iq.

9.   The position control device according to claim 7, wherein an equation of state for the control system is expressed as follows:

$$\begin{cases} \dot{x} = A \cdot x + B \cdot u \\ y = C \cdot x \end{cases}$$

$$A = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 \\ Kt/J \end{bmatrix}, C = \begin{bmatrix} 1 & 0 \end{bmatrix}, x = \begin{bmatrix} \theta \\ \dot{\theta} \end{bmatrix}, u = Iq,$$

wherein J represents moment of inertia and Kt represents a torque constant of the servomotor.

10.   The position control device according to claim 9, wherein an equation of motion for the control system is expressed as follows:

$$J\ddot{\theta} = Kt \cdot Iq - d$$.

11. The position control device according to claim 9,

wherein the sliding mode controller is input with command velocity $\dot{r}$ and

command acceleration $\ddot{r}$, and with C_{ff} and A_{ff} as gain, wherein the switching

function σ is expressed as follows:

$$\sigma = S \cdot x + C_{ff} \cdot r + A_{ff} \cdot \dot{r}$$

$$S = [S_2 \quad S_3],$$

wherein the control input u is the sum of linear control input u_l and non-

linear control input u_{nl}, and

wherein the linear control input u_l is expressed as follows:

$$u_l = -(S \cdot B)^{-1}(S \cdot A \cdot x + C_{ff} \cdot \dot{r} + A_{ff} \cdot \ddot{r})$$.

12. The position control device according to claim 11, wherein non-linear

control input u_{nl} is expressed as follows:

$$\overline{u}_{nl} = -k(\overline{S} \cdot B)^{-1}\frac{\overline{\sigma}}{|\overline{\sigma}| + \eta}$$.